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ABSTRACT

A study investigated whether semantic mapping is more effective for poor readers instructed in a small group of poor readers or in a class of students with mixed reading abilities. Students in five fourth-grade classes served as the control, receiving no semantic mapping instruction. Subjects, 39 fourth-grade poor readers, were presented semantic mapping instruction in two of the three daily lessons, once in a small group (poor readers only) and once in a large group (whole class). On each day, eight target vocabulary words pertaining to one of three specific topics (water, stores, or Olympics) were introduced. On the third day, subjects received no instruction but were tested on the vocabulary pertaining to the third topic. One and a half weeks following completion of treatment the twenty-four item vocabulary test that had been administered seven weeks prior to treatment was given again. Analysis of daily test performance, as well as pre- to posttreatment gain scores, indicated that there were no significant differences between poor readers' performance after small group instruction and their performance after large group instruction. Poor readers who received semantic mapping instruction had significantly higher pretest to posttest gain scores than did students in the heterogeneously grouped outside control classes. This finding lends further support to the effectiveness of semantic mapping as an instructional strategy for vocabulary development. (EL)

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Program Report 85-4

AN INVESTIGATION OF TWO INSTRUCTIONAL SETTINGS IN THE USE OF SEMANTIC MAPPING WITH POOR READERS

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A Report from the Program on Classroom Processes:
Skill Development--Language Arts

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Abstract

Research has shown that semantic mapping is an effective strategy for students of all reading levels when instruction is presented in a heterogeneous whole class situation. The primary focus of this study was to investigate whether semantic mapping is more effective for poor readers when these students are instructed with other poor readers in a small group or when they are instructed in a class of students with mixed reading abilities.

Subjects for the study were from fourth-grade classrooms in a large midwest suburban school district. Thirty-nine poor readers from six classes participated in the full instructional treatment, while students from five other classes served as an outside control. The six treatment classes were randomly assigned to a counterbalanced order of treatment condition and topic for three daily lessons. In two of the three lessons, semantic mapping instruction was presented, once in a small-group (poor readers only) and once in a large-group (whole class). On the third day subjects received no instruction but were tested on vocabulary for the third topic.

Analysis of daily test performance, as well as of pre- to post-treatment gain scores, indicated that there were no significant differences between poor readers' performance in the small group instructional setting and their performance in the large group setting. Poor readers who received semantic mapping instruction had significantly higher pretest to posttest gain scores than did subjects in the five heterogeneously grouped outside control classes. This finding lends further support to the effectiveness of semantic mapping as an instructional strategy for vocabulary development.

I. Introduction

The work reported in this paper concludes five years of research by the Project on the Investigation of the Effectiveness of Vocabulary Instruction. The focus of project research has been on investigating the effectiveness of vocabulary teaching strategies, with particular emphasis on the two semantic-based instructional strategies of semantic mapping and semantic feature analysis. Semantic mapping and semantic feature analysis are methodologies which build upon the prior knowledge bases of children. Both strategies are based on the formation of categorical relationships and capitalize on the hierarchical nature of memory structure.

In 1981 and 1982 a series of studies was conducted to evaluate semantic mapping and semantic feature analysis as instructional strategies for general vocabulary acquisition. Both strategies proved effective with various populations of intermediate grade level children, even when long term retention was assessed (Johnson, Toms-Bronowski, & Pittelman, 1982; Johnson, Pittelman, Toms-Bronowski, Chu-Chang, Tsui, Yin, Chien, & Chin, 1982). In 1983 the research focus expanded to include an evaluation of the effectiveness of the two prior knowledge-based strategies as methods of pre-reading instruction to enhance passage comprehension. Results confirmed that, in addition to being effective strategies for general vocabulary development, semantic mapping and semantic feature analysis are viable pre-reading strategies for teaching passage-specific vocabulary (Johnson, Pittelman, Toms-Bronowski, and Levin, 1984; Jones, 1984).

In 1984 nine classroom applications of the semantic mapping procedure in a variety of content areas were presented in the report Classroom Applications of the Semantic Mapping Procedure in Reading and Writing (Hagen & Pittelman, 1984). The paper also discussed the theoretical rationale for the effectiveness of the semantic mapping procedure and presented a review of research studies on semantic mapping.

The final study in this research series, which is discussed in this paper, focused on the use of semantic mapping with students of poor reading ability. While previous research has shown that semantic mapping is an effective vocabulary acquisition technique for students of all reading ability levels, instruction had been presented only in a heterogeneous whole class situation (Ahlfors, 1979; Hagen, 1980; Johnson, Toms-Bronowski, & Pittelman, 1982; Johnson, Pittelman, et al., 1982). The primary question addressed in this study was whether poor readers learn more from semantic mapping vocabulary instruction when instructed with other poor readers in a small group (as is typically the case for reading instruction), or whether poor readers learn more through semantic

mapping when instructed as part of a whole class of students with mixed reading abilities.

By investigating the use of semantic mapping in two common instructional settings, we hoped to gain a better understanding of the organizational setting that best facilitates vocabulary acquisition for poor readers. The two settings of interest were a small homogeneous group in which poor readers would have a greater opportunity to participate and a large heterogeneous group in which poor readers may possibly be afforded a richer source of conceptual information about the topic being mapped.

IMPORTANCE OF VOCABULARY INSTRUCTION

Research has shown that there is a high correlation between students' demonstrated reading comprehension levels and their vocabulary knowledge levels (Hilliard, 1924; Mezynski, 1983). The strong relationship between word knowledge and comprehension is further supported by the widely accepted belief that a person's reading ability is based on a number of underlying component or subskill abilities (Anderson & Freebody, 1979; Barrett, 1968; Davis, 1942, 1944, 1968, 1972; Hunt, 1957; Johnson & Pearson, 1984; Otto & Askov, 1974; Rosenshine, 1980; Spearritt, 1972). The early factor-analytic studies of reading comprehension focused on specifying the skills or skill areas important for comprehension. Davis, a notable researcher in this area, factor analyzed nine reading comprehension subskills (from the Cooperative Reading Comprehension Test, Form Q) and noted that two of the components, word knowledge and reasoning in reading, accounted for 89% of the variance in individuals' test scores. Not only has word knowledge been identified as a significant component of reading comprehension by Davis (1942) and Hilliard (1924), but there is also research that suggests that word knowledge is the most important component of reading ability (Johnson, Toms-Bronowski, & Buss, 1983; Thorndike, 1973-74; Thurstone, 1946).

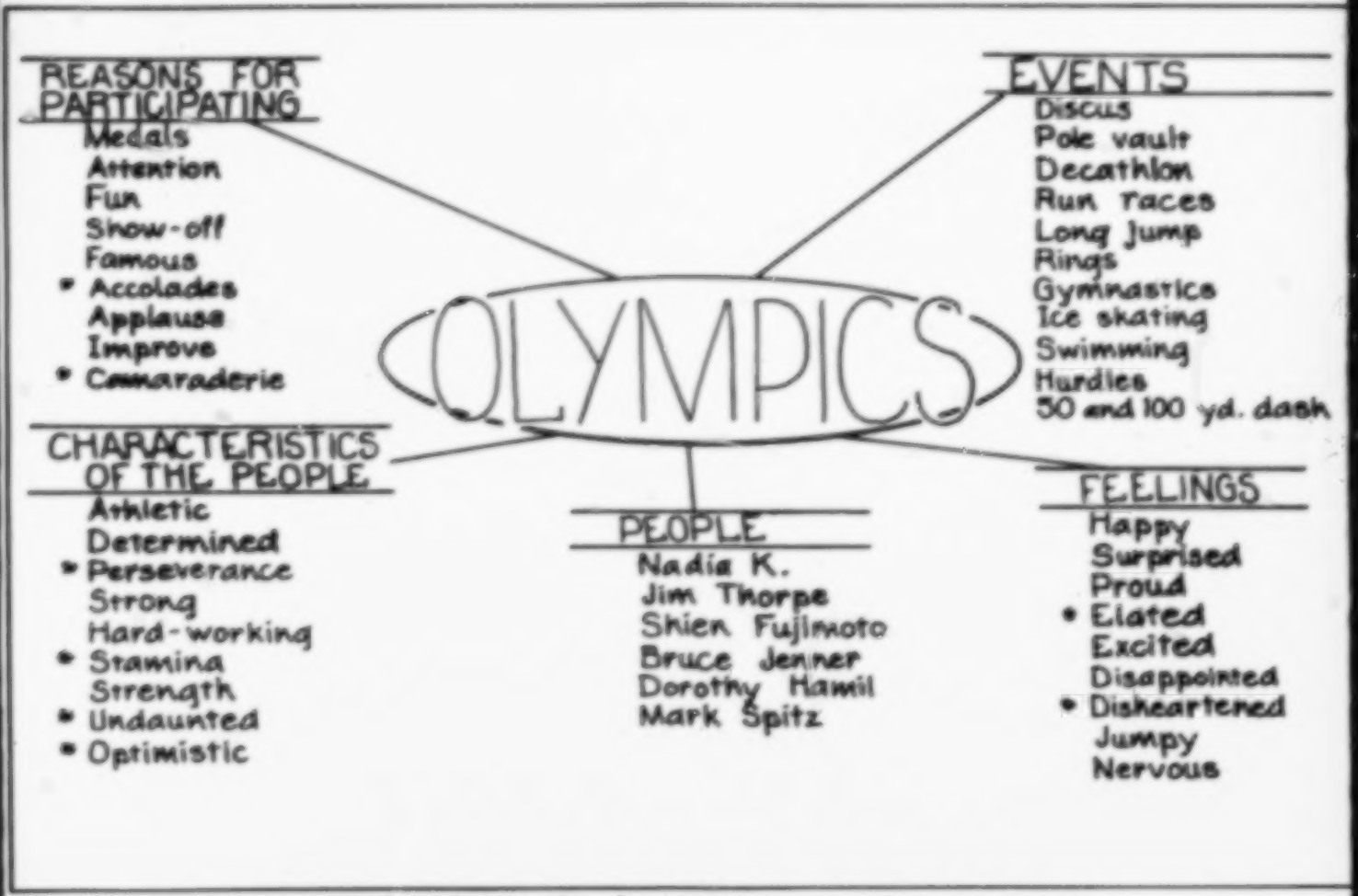
There appears to be general agreement among teachers and teacher educators alike that vocabulary instruction should be an important component of the elementary classroom curriculum. In a survey of 228 first through fifth-grade elementary school teachers from seven areas of the country, there was overwhelming support for the teaching of vocabulary words before students read a basal selection (Johnson, Levin, & Pittelman, 1984). When teachers were asked if they teach vocabulary words before students read a basal passage, the percentage of positive responses ranged from 100 percent of first-grade teachers to 87.50 percent of fifth-grade teachers. In addition, 99 percent of the teachers surveyed said that they also teach vocabulary as part of content area instruction.

While direct vocabulary instruction is important and necessary for all students, it appears to be of additional importance for students who are poor readers. Gambrell, Wilson, and Gantt (1981), in a study with fourth-grade students, found that, while high ability readers encounter only one unknown word out of 100 in a typical instructional reading passage, low ability readers encounter an unknown word in one out of every 10 words in their instructional readings. Alpert (1975), in a study of second-grade classrooms, noted that the mean readability level of basal materials for children in the high group was below their reading ability (as measured by achievement test scores), while the mean readability level of the material used for the low group was higher than their reading level. There is an intuitive educational notion that "if you don't know the words, you're not going to understand the passage." It is clear that low ability readers are frequently encountering words they do not know, and when students have difficulty understanding individual word meanings within connected discourse reading comprehension is impaired. Effective strategies for vocabulary instruction need to be a high priority for teachers of poor readers.

The present research focuses on the effects of varied instructional settings for teaching vocabulary to students who have been identified as poor readers. The instructional method of interest, semantic mapping, has typically been used in a heterogeneous, large group (whole class) setting for vocabulary development in both the content areas and in language arts. Semantic mapping has also been successfully used as a pre-reading activity during reading instruction by teachers who group students by ability for reading. Indeed, teacher testimonials support the power of semantic mapping as an instructional strategy (Hagen-Heimlich & Pittelman, 1984).

DESCRIPTION OF SEMANTIC MAPPING

Semantic mapping is a categorical structuring of information in graphic form. It is an individualized content approach in that students are required to relate new words to their own experiences and prior knowledge (Johnson & Pearson, 1984). A completed semantic map provides the teacher with information about what the students know and reveals anchor points upon which new concepts can be introduced. (Figure 1 is a map from a vocabulary lesson developed for the topic Olympics.)



*Vocabulary word introduced by the teacher

Figure 1. Semantic map developed for the topic Olympics.

A general instructional sequence for semantic mapping is:

1. Choose a word central to the topic the class will be studying.

2. Write the word on a chalkboard, a large chart tablet, or on a transparency.

3. Encourage the class to brainstorm words that are related to the selected key word. List these words by categories on the chalkboard.

4. Have the students work individually for several minutes to think of as many words as they can that are related to the key word and list these words, by categories, on a piece of paper.

5. Have the students share their prepared lists orally and add their words to the class map in categories.

6. Have the students suggest labels for the categories on the semantic map. (For example, Olympic category labels could include Olympic Events, Reasons for Participating in the Olympics, and Feelings People Have After An Event.)

7. Discuss the entries on the semantic map. Encourage students to become aware of the new words, gather new meanings from old words, and draw relationships among the new and old words. (For more specific discussion techniques to use in a semantic mapping lesson, see Johnson & Pearson, Teaching Reading Vocabulary, pp. 37-41).

The procedure of mapping a topic provides students with a means for both activating and enhancing their knowledge bases regarding the specific topic(s) and words discussed. The vocabulary teaching methodology of semantic mapping results in a categorical structuring of information in graphic form. The map graphically displays known and new words under appropriately labeled categories or conceptual subtopics. Through the instructional process, students are given the opportunity to learn the meanings and uses of new words and new meanings for known words. In addition, they see the specific relationships among concepts.

CATEGORIZATION SKILLS OF LOW ABILITY READERS

There is research to suggest that poor readers have difficulty arranging information into adequate conceptual categories (Maroldo,

1975; Serafica & Sigel, 1970). Maroldo investigated the relationships between reading comprehension, IQ, and equivalence range (the ability to differentiate and integrate information into hierarchical levels) with good, average, and poor sixth-grade students. Multidimensional scaling and varimax rotation analyses indicated that the categorizing styles of good and average readers were different from those of poor readers. When subjects were given 50 word cards to categorize, the category labels and words included within the category were not the same across the three ability groups. Maroldo concluded that the clustering or categorization style of good and average readers was more orderly and internally consistent than was the categorization style of poor readers.

The research of Serafica and Sigel more precisely indicated the types of categorizing styles poor readers employ in comparison to students with no reading disability. In a study which compared 24 reading disabled boys with 28 boys who showed no reading disability, Serafica and Sigel found major differences between the two groups in conceptual and integrative abilities. The reading disabled boys in the experimental group seemed less capable of categorizing according to objectively based conceptualizations. The disabled readers had difficulty attaining closure to the categorization tasks because they had difficulty "constructing or generating new concepts through the combination of familiar concepts into new ones" (p. 112).

If, through the generation of a semantic map, low ability readers in the present study are led to link the meanings of old and new words to appropriate categories, as well as to their knowledge bases regarding the general topic of the map, then their retrieval of accurate word meanings may be substantially aided.

INSTRUCTION OF POOR READERS

There are conflicting results on the type of instructional settings or groupings that best facilitate the achievement of students of low ability level. Conclusions from research on ability grouping for instruction suggest that low ability students either suffer when homogeneously instructed (Webb, 1977; Winn & Wilson, 1983) or perform the same as they do in mixed groups when specific learning outcomes are measured (Kulick & Kulick, 1982).

Findings from research on the effects of group size on instruction are also mixed. Rosenshine (1980), for example, concluded that low ability students learn more when working in large group settings, while other researchers (Peterson & Janicki, 1979; Peterson, Janicki, & Swing, 1981) have found substantiation for low ability students performing better and having more positive

attitudes in small-group instructional settings. In the present study, two grouping paradigms, small homogeneous group and large heterogeneous group, were employed in order to examine the instructional advantages of semantic mapping in each of these two settings. The two groupings selected for examination reflect how poor readers are typically instructed in classrooms.

A related issue, which also pertains to the effectiveness of instruction for poor readers, is whether teachers differentiate instruction for their various ability level groups. While research findings in this area are contradictory, many researchers have concluded that teachers do indeed differentiate instruction by ability (Allington, 1983; Alpert, 1975; Serafica & Sigel, 1970; Winn & Wilson, 1983). There is also some evidence that these teaching adaptations may result in discrimination against low ability groups (Brophy & Good, 1970; Good, 1970; Rist, 1970).

Results from classroom observational research have indicated that poor readers receive more isolated skill instruction (decoding) than any other ability group (Allington, 1983; Alpert, 1975; Gambrell et al., 1981), that poor readers are typically given fewer response opportunities during instruction (Good, 1970; Rist, 1970), and that poor readers are given less verbal affirmation or nonverbal cues of positive performance (Winn & Wilson, 1983).

The instructional format of semantic mapping has the potential of being an extremely effective method of teaching new vocabulary to poor readers. It is expected that vocabulary instruction through semantic mapping will provide poor readers with an instructional approach that is meaning centered rather than one that is based on isolated skills. The structuring of concepts in graphic form within appropriate categories may serve to arrange old and new information in a concrete manner that would facilitate low readers' learning of new words.

Another aspect of the semantic mapping procedure that is relevant to the instruction of poor readers is that mapping provides a needed opportunity for poor readers to actively participate (both in the class discussion and in the development of their own maps) and receive positive acceptance and reinforcement for their contributions. It is expected that the poor readers will more actively contribute to the group semantic map in the small homogeneous group setting than they will in the large heterogeneous situation and therefore reap the potential benefits of more active participation and more teacher reinforcement. However, it is also possible that in a large heterogeneous class situation the suggestions offered by the other students will be as beneficial to the poor readers' conceptual understanding of the topic as having the opportunity to provide more of their own suggestions to the class map.

II. Method

SUBJECTS

Students for the study were from 11 fourth-grade classrooms from 8 schools in a large midwest suburban school district. Students from six of the eleven classes participated in the instructional treatment and in the pre- and posttest measure administrations, while students from the remaining five classes served as an outside control group, participating only in the administration of the pre- and posttest measures. Two criteria were used to select the six classes that participated in the instructional treatment. The first criterion was the number of low ability students in the class. This information was taken from class lists on which the teachers had indicated the reading group (high, average, low) and reading level (i.e., above average, average, low-average, or low) of each student. The classes that had the highest number of students who either were in the low reading group or had been described as low or low-average readers were considered for participation in the study. The second criterion for class selection was the standardized reading and vocabulary test scores from the Iowa Test of Basic Skills. These scores were used to determine the comparability between whole classes as well as between the groups of students who had been identified as the low readers in each class.

All students in the low or low-average reading groups were selected to receive the instructional treatment planned for the poor readers, with the exception of students who had been identified as LD or ESL. When power calculations showed that the sample using only the first criterion was too small, the two students in the average reading group with vocabulary scores below the 40th percentile were added. Using this procedure, a total of 45 students were identified as the low readers who would receive the instruction.

DESIGN

A graeco-latin square design was used to assign classes randomly to a counter-balanced order of treatment condition and topic (see Figure 2). Classes were assigned to each of two orthogonal latin squares based on the mean scores of those students who had been identified as low readers. The three classes with the highest mean scores for the low readers were assigned to one square while the three classes with the lowest mean scores were assigned to the other.

		TEACHER A	TEACHER B	TEACHER C	TEACHER D	TEACHER E	TEACHER F
DAY 1	Topic:	Water	Olympics	Stores	Olympics	Stores	Water
	Instruction:	Whole Class	Small Group	None	None	Whole Class	Small Group
	Worksheet:	Whole Class	Small Group	Whole Class	Whole Class	Whole Class	Small Group
DAY 2	Topic:	Stores	Water	Olympics	Stores	Water	Olympics
	Instruction:	Small Group	None	Whole Class	Small Group	None	Whole Class
	Worksheet:	Small Group	Whole Class	Whole Class	Small Group	Whole Class	Whole Class
DAY 3	Topic:	Olympics	Stores	Water	Water	Olympics	Stores
	Instruction:	None	Whole Class	Small Group	Whole Class	Small Group	None
	Worksheet:	Whole Class	Whole Class	Small Group	Whole Class	Small Group	Whole Class

Note: A Practice Lesson will be presented to the whole class preceding Day 1. (There will be no worksheet for the Practice Lesson.)

Figure 2. Design of the study.

PROCEDURE

Seven weeks prior to treatment, a vocabulary pretest was administered to all 11 fourth-grade classrooms to obtain baseline information regarding students' knowledge of the target vocabulary words. In Spring 1984, the week before the study was to begin, a two-hour training session was held with the participating teachers. At the training session the teachers were given an introduction to the semantic mapping procedure. The lesson plans for the practice lesson and for the two treatment lessons were explained in detail. The schedules for instruction and assessment were also distributed and discussed. (A sample schedule is presented in Figure 3.)

Three days preceding the beginning of treatment, the teachers presented the practice lesson to the whole class. The practice lesson acquainted the students with the semantic mapping procedure and gave the teachers an opportunity to practice teaching a semantic mapping lesson. The topic of the practice lesson and the target words to be introduced in the lesson were selected by the classroom teacher.

Treatment was conducted over a three-day period. On one of the days (the control day), the teacher did not present a vocabulary lesson but still administered the vocabulary test to her whole class. On the other two days, each teacher presented one semantic mapping vocabulary lesson to her whole class and one semantic mapping vocabulary lesson to the small group of children who had been identified as the low readers. In each of these lessons, eight target vocabulary words pertaining to a specific topic (Water, Stores, or Olympics) were introduced. Following each lesson the teacher administered a vocabulary test of the target words. A project staff member was present during each lesson to record the number of times each student participated in the discussion and to confirm that teacher followed the prescribed lesson plans.

One and a half weeks following the completion of treatment, the twenty-four item vocabulary test that had been administered seven weeks prior to treatment was again given to all eleven classrooms.

MATERIALS

DEVELOPMENT OF TOPICS FOR MAPS

Three topics were selected to be used in the treatment lessons. To select the topics, numerous semantic maps from

SCHEDULE

PRACTICE LESSON	Topic: Teacher's Choice Instruction With Whole Class No Vocabulary Worksheet
DAY 1	Topic: WATER Instruction With Whole Class Vocabulary Worksheet With Whole Class
DAY 2	Topic: STORES Instruction With Small Group Vocabulary Worksheet With Small Group
DAY 3	Topic: OLYMPICS No Instruction Vocabulary Worksheet With Whole Class

Figure 3. Sample schedule of instruction and assessment.

previous studies were reviewed to identify potential target vocabulary words that were both likely to be unfamiliar to fourth-grade students and considered worthwhile to teach. Sets of vocabulary words were also generated for topics that had been identified as being of interest to students through a review of student publications, textbooks, and current magazines. The final selection of the three topics to be used in the study was based on the number of potential target words that could be identified for each topic. The three topics selected were Water, Stores, and Olympics.

IDENTIFICATION OF TARGET VOCABULARY

Two procedures were used to identify the eight target words that were to be taught in each lesson. First, 12-16 words were selected from the list of potential target words that had been generated for each topic. To verify that the words would be unfamiliar to the students, the words were checked for grade level familiarity using The Living Word Vocabulary (Dale & O'Rourke, 1976) and The Ginn Lexicon (Johnson & Moe, 1983). Second, a matching test was developed for the 44 potential target words. The test consisted of 11 sets of words, with seven response choices for each set of four words (see Figure 4). There were four sets of words for Olympics and Stores and three sets of words for Water. The order of the sets of words on the test was randomly assigned. A practice item, as well as directions for the classroom teacher to use when administering the test, were also developed.

The pilot test, which took approximately 15 minutes, was administered to 10 classrooms from the same school district in which the study took place. (None of the eleven classrooms that would be participating in the study were included.) To determine the level of unfamiliarity of each word, the percentage of correct responses for each potential target word was calculated. The eight least familiar words for each of the three topics were selected.

DEVELOPMENT OF THE VOCABULARY PRETEST, DAILY TEST, AND POSTTEST

Seven weeks prior to treatment a pretest was administered to the classrooms participating in the study to obtain baseline data concerning students' knowledge of the target vocabulary words. The pretest was a compilation of the three daily vocabulary tests. daily tests had a matching format like the pilot test. The posttest, given one and a half weeks following the last treatment day to more fully measure the effects of the treatments, was the

7. _____ stamina	A.	aching muscles
	B.	very happy
_____ undaunted	C.	exercise
	D.	fearless
_____ optimistic	E.	disappointed
	F.	strength
_____ ecstatic	G.	hopeful

Figure 4. A set of words for the topic Olympics, from the Vocabulary Pretest.

same test as the pretest. A practice item was presented for each of the tests to acquaint students with the format of the test.

LESSON PLANS

Lesson plans for the practice lesson and the treatment lessons consisted of a statement of lesson objectives, a listing of materials required, a set of standard procedures to use to introduce target vocabulary during the development of the map (see Figure 5). A prototypic semantic map was also provided for each topic. This map contained the topic, suggested category labels for the target words, the target words and their definitions, and suggestions for other possible categories the teacher might use in the lesson. (See Figures 6, 7, and 8).

Six weeks before the beginning of treatment, the lesson plans were pilot tested by four fourth-grade teachers from another school district. These teachers were asked to follow the plans and provide suggestions for improvements. Project staff observed the lessons to note any possible revisions needed in the plans. Following the pilot testing, minor modifications were made in the lesson plans.

SEMANTIC MAPPING LESSON PLAN

Objectives:
- Students will brainstorm words related to a specific topic
- Students will demonstrate an understanding of the target vocabulary words

Materials:
- Teacher's copy of the semantic map containing the target vocabulary words and definitions
- One blank map for each student
- Pencil for each student
- Chalkboard and chalk (or transparency, overhead projector, and AV pen)

Procedure:

1) Explain the purpose of the lesson, i.e., to learn new words.

2) Review procedures for semantic mapping. Draw a blank map on the chalkboard.

3) Distribute blank maps to students.

4) Introduce the topic, write it in the circle on the chalkboard, and have the students write the topic in the circle on their maps. Tell the students that as they brainstorm words for the topic, you will have some words that you want to introduce and that whenever you write one of these words on the board, you are going to put a star by it. Tell the students that they should copy the starred words on their maps.

5) Elicit words from students and write them in related groupings on the map on the chalkboard. Tell the students that if they really like a word, they can add it to their own maps.

6) After 3-4 words are listed in a group, discuss an appropriate category label and write it above that list of words.

7) Present a target word, selecting the appropriate procedure from the two shown below:

- If the target word fits into an existing category:
  a) Add the word to that list.

  b) Pronounce the target word and have the students repeat it. Then discuss its definition. Try to relate the target word to another word on the map.

  c) Remind students to copy the category label and target word on their maps.

- If the target word does <u>not</u> fit into an existing category:
  a) Suggest an appropriate category label and write it on the

Figure 5. Semantic mapping lesson plan.

board. Have students brainstorm 2-4 related words. Then add the target word to that list.

b) Pronounce the target word and have the students repeat it. Then discuss its definition. Try to relate the target word to another word on the map.

c) Remind students to copy the category label and target word on their maps.

8) Continue brainstorming a few more new words.

9) Add each remaining target word, following the procedure in Steps 7 and 8. (You may add the last few target words in each category without having students brainstorm additional words in between.)

10) Allow students 2-3 minutes to add words or categories to their maps independently.

11) Ask students to share their words or new categories and add them to the map on the board.

12) Review each target vocabulary word. Use as many of the following techniques as time permits.

Cross-category comparison and questions to clarify word meanings--Ask questions which cause students to apply the target words. In the questions, relate words in one category to those in another (e.g., Would you find nominal or exorbitant prices in a store with high overhead? Would you find garbage in pristine water? Is seaweed considered debris? Would someone who just received accolades feel disheartened or elated?)

Synonyms for target words--Let students suggest words that have a similar meaning.

Antonyms for target words--Let students suggest words that have an opposite meaning.

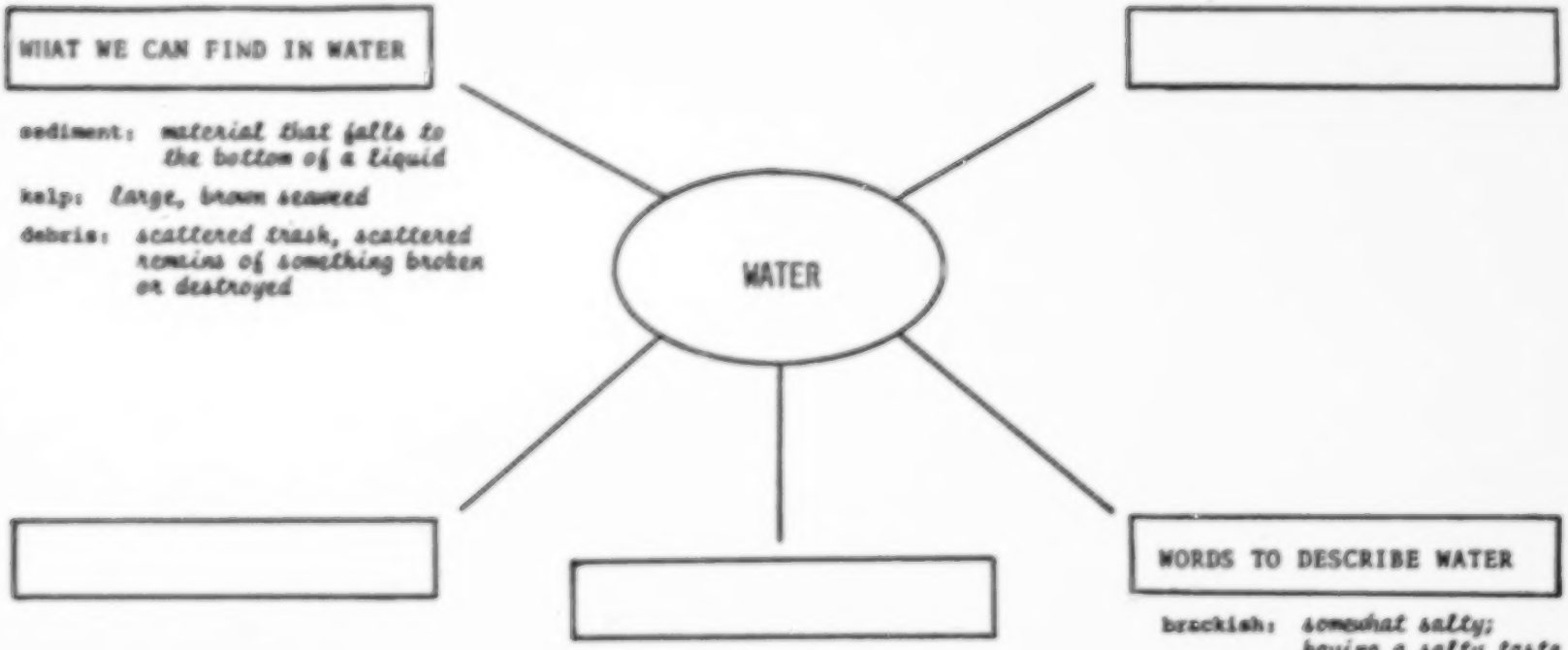
Sentences--Have students use the target words in sentences.

13) Collect the students' maps and erase the chalkboard (or remove the transparency).

14) Tell the students that now they are going to do a worksheet to see how well they remember some of the new words that were introduced. (Refer to the "Directions for Administration.")

Figure 5. (Continued).

Name _____


WHAT WE CAN FIND IN WATER
sediment: material that falls to the bottom of a liquid
kelp: large, brown seaweed
debris: scattered trash, scattered remains of something broken or destroyed
WATER
WORDS TO DESCRIBE WATER
brackish: somewhat salty; having a salty taste
turbulent: very rough; not smooth
pristine: clean and unspoiled; pure
placid: calm; peaceful
tepid: a little warm; lukewarm

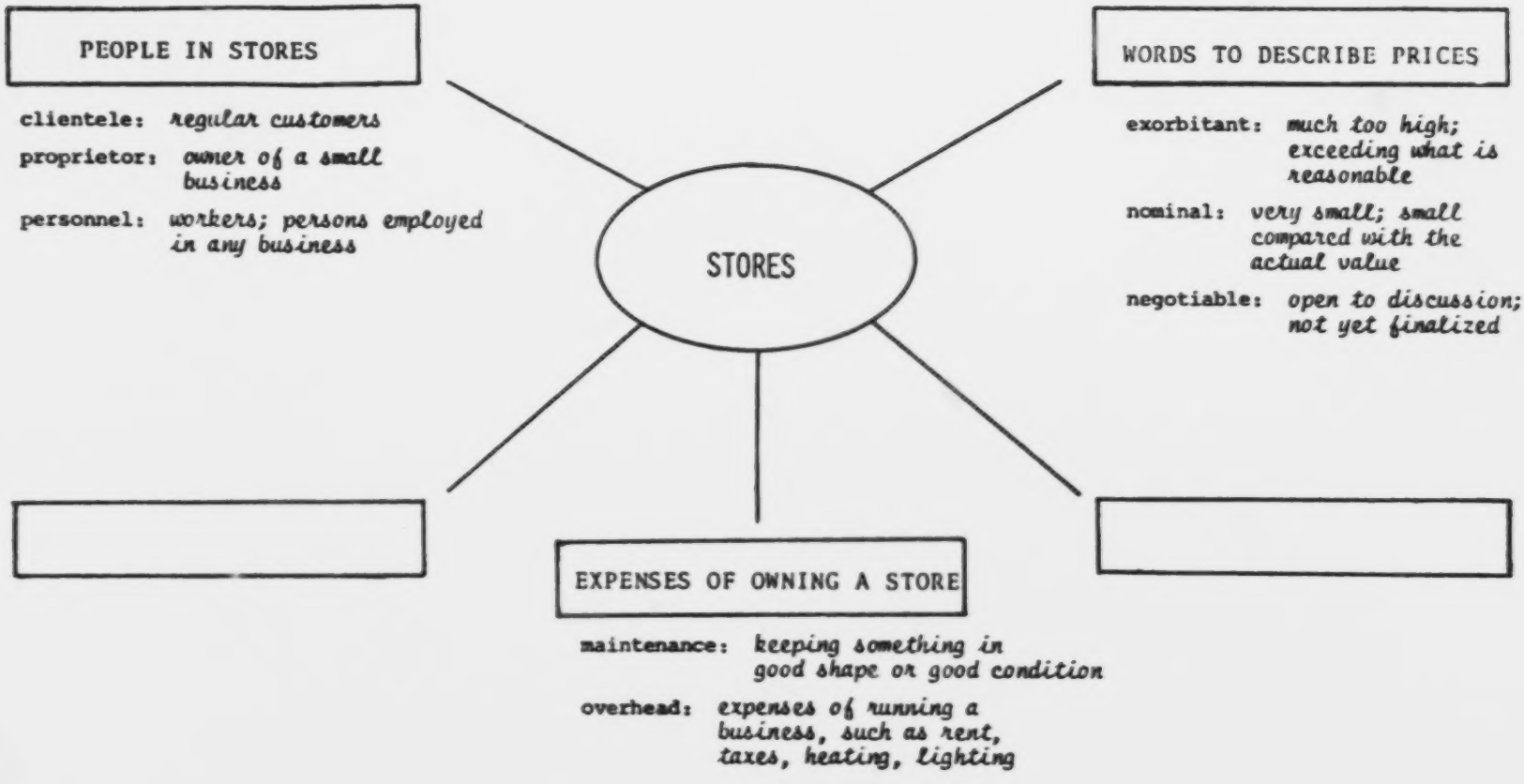
Other possible categories:

HOW WE USE WATER

WHERE WE CAN FIND WATER

Figure 6. Prototypic semantic map for the topic Water.

Name _____


PEOPLE IN STORES
clientele: regular customers
proprietor: owner of a small business
personnel: workers; persons employed in any business
WORDS TO DESCRIBE PRICES
exorbitant: much too high; exceeding what is reasonable
nominal: very small; small compared with the actual value
negotiable: open to discussion; not yet finalized
STORES
EXPENSES OF OWNING A STORE
maintenance: keeping something in good shape or good condition
overhead: expenses of running a business, such as rent, taxes, heating, lighting

Other possible categories:

KINDS OF STORES

THINGS TO BUY IN STORES

Figure 7. Prototypic semantic map for the topic Stores.

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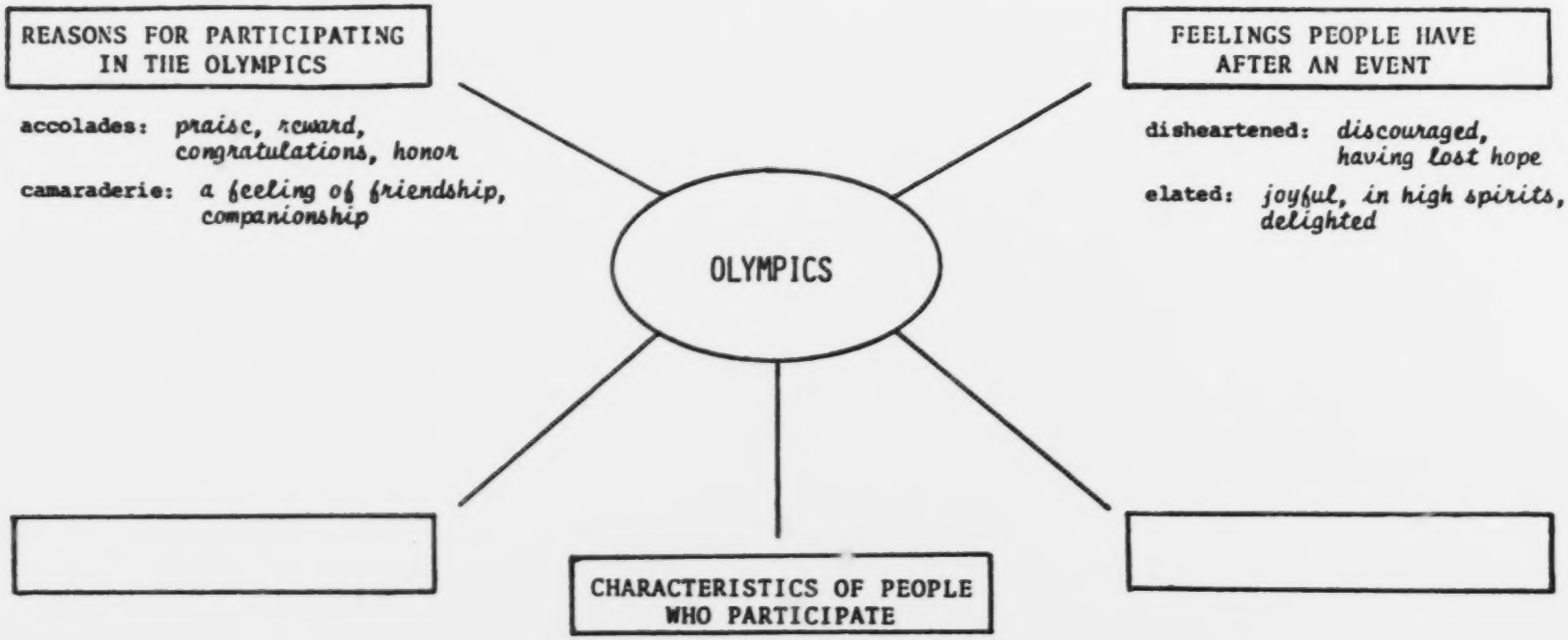
REASONS FOR PARTICIPATING IN THE OLYMPICS
accolades: praise, reward, congratulations, honor
camaraderie: a feeling of friendship, companionship
FEELINGS PEOPLE HAVE AFTER AN EVENT
disheartened: discouraged, having lost hope
elated: joyful, in high spirits, delighted
OLYMPICS
CHARACTERISTICS OF PEOPLE WHO PARTICIPATE
perseverance: to keep working at something in spite of difficulties; persistence; "stick-to-it-iveness"
stamina: strength, endurance, capacity to withstand fatigue or hardship
undaunted: fearless, courageous
optimistic: hopeful, anticipating a favorable outcome

Other possible categories:

OLYMPIC EVENTS

PEOPLE WHO HAVE PARTICIPATED

Figure 8. Prototypic semantic map for the topic Olympics.

III. Results

Of the 45 students who were identified as poor readers, 6 were absent during treatment or testing. Data analysis for the 6 treatment classes was therefore based on the remaining 39 students who were present for all phases of the study.

The results in Table 1 indicate the degree to which the 39 poor readers learned the vocabulary words using the semantic mapping procedure through both the small group and the large group instructional settings. Performance on the three daily tests indicated that when subjects received the semantic mapping instruction they generally learned about 55 percent of the words, whereas when these same subjects received no instruction (control condition) they knew only about 18 percent of the words. (Chance level on the matching test format was approximately 12 percent.) A multivariate analysis of variance using repeated measures showed that the treatment and control conditions differed markedly ($F(2,33) = 45.85$, $p < 0.001$). For all 6 classes, treatment condition means exceeded the corresponding control mean. This finding was significant for all of the six small group lessons and for five of the six large group lessons ($p < .05$).

Table 1

Percentage Scores for Daily Vocabulary Tests for the Poor Readers in the Six Treatment Classes
(N = 39)

	TOPIC			
Condition	Water	Stores	Olympics	Total
Control	21.88	17.71	15.00	17.81
Small	76.40	47.50	57.29	58.31
Large	52.50	58.33	50.00	52.19
Total	59.37	41.67	38.78	42.71

Of primary interest in this study was whether small group semantic mapping instruction better facilitated poor readers' learning of the vocabulary words than did large group instruction. There was no significant difference on daily test scores whether subjects were instructed in small groups or in large groups ($F(1,34) = 1.90$, $p > 0.15$).

Analysis of the gain scores between the pre- and posttest showed similar trends. As indicated in Table 2, subjects generally obtained significant pretest to posttest gains, whether in the large or the small group. Furthermore, there were no significant differences in gain scores between large group instruction and small group instruction.

Table 2

Percentage Scores for Vocabulary Pre- and Posttests for the Poor Readers in the Six Treatment Classes

	TOPIC					
Condition	Water		Stores		Olympics	
	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest
Control	18.75	31.25	16.67	39.58*[a]	16.67	15.83
Small	12.50	46.92*	11.67	20.83	17.71	37.50*
Large	14.17	32.50*	10.42	46.92*	26.04	40.63*
Total	15.06	36.86*	12.82	34.94*	19.89	30.13*

[a] It was reported that the students in one of the two control classes for the topic Stores were exposed to some of the Stores vocabulary words between the pretest and posttest resulting in a significant gain score between the pre- and posttest.

* Significantly higher than respective pretest score, $p < .01$.

Twenty students were observed in both small group and large group lessons. An analysis of the rate of student participation showed that the mean difference was 1.45 additions to the map

favoring small group. This difference is significant under a Wilcox one-sample test ($W=126$, $p < 0.005$ for 16 non-zero differences). The product moment correlation of the number correct on the daily test with the number of additions to the map was -0.013, so there was no association of class contributions with daily test scores. Also, similar correlations for small group instruction and large group instruction separately showed no association.

A comparison of test performance by the five classes who served as an outside control (did not receive any instruction) with the performance by the poor readers in the six classes that received treatment reaffirmed the effectiveness of semantic mapping as an instructional procedure. As indicated in Table 3, the mean gain from the pretest to the posttest for subjects in the outside control classes for the topics Olympics, Water, and Stores was respectively -.07, 1.9, and 2.4 percent. None of the gains differed significantly from zero ($F(1,96) = 0.15$, $p > 0.6$; $F(1,96) = 0.80$, $p > 0.30$; $F(1,96) = 2.04$, $p > 0.15$). The poor readers from the six treatment classes who participated in either the large group or small group instruction had significantly higher pretest to posttest gain scores across all three topics than did the students in the control classes.

Table 3

Percentage Scores for Vocabulary Pre- and Posttests for Outside Control ($N = 101$)

	TOPIC			
Test	Water	Stores	Olympics	Total
Pretest	21.91	21.29	14.11	19.10
Posttest	21.16	23.14	16.46	20.26

Other analyses performed indicated that the six treatment classes did not differ ($F(2,33) = 2.77$, $p > 0.08$) when averaged over topic and treatment. Mean scores for subjects in the low and high latin squares were nearly the same ($F(1,33) = 0.53$, $p > 0.40$). Furthermore, order effect for instructional conditions was small ($F(2,33) = 2.08$, $p > 0.10$).

IV. Conclusions

Two conflicting expectations regarding the effects of group size on semantic mapping instruction for low ability readers are intuitively justifiable. The first expectation is that in a semantic mapping lesson poor readers would learn more when taught as part of a large heterogeneous group. The reasoning for this expectation is that poor readers would benefit from the rich discussion that would occur in the large group as a result of the contributions of the more able students. The reverse expectation, also quite plausible, is that poor readers would learn more when instructed in a smaller group with other less able readers. This expectation stems from the belief that both the smaller group size and the absence of better readers who might dominate the discussion and inhibit the poor readers, would provide a learning climate that would benefit poor readers.

The results of the present study do not support either expectation. Poor readers performed as well when taught in the homogeneous small group as when taught in the heterogeneous large group. The benefits associated with the two expectations possibly counterbalanced one another. While poor readers did participate more in the small group, there was not a significant correlation between participation and daily test scores. The instructional setting was not as important as the actual learning experience the students were participating in.

The poor readers in this study were storing information and learning new words through semantic mapping, an instructional strategy that is based on a categorization process. Although this skill orientation is supposedly difficult for poor readers, the results of the study verified that they do benefit from this type of instruction. In the semantic mapping lessons the students received guidance in establishing categories and gained experience in categorizing. Classroom teachers who want to use semantic mapping can rest assured that their poorer readers <u>will learn</u> through this approach, as is evident from the increase in scores from the pre- to the posttest. Furthermore, teachers can feel comfortable using semantic mapping in all reading ability groups and whole class content area instruction.

Researchers need to continue their search for factors which have an impact on vocabulary growth. These factors need to be considered both independent of, and in combination with, the size of the instructional group. While instructional group size is undoubtedly an important contributor to many elements of teaching and learning, in this study group size did not seem to be a factor that would influence the effectiveness of semantic mapping as an instructional strategy for vocabulary development.

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